

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RH/J/AD/ASB.4	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 03/02693	International filing date (day/month/year) 24.06.2003	Priority date (day/month/year) 31.08.2002
International Patent Classification (IPC) or both national classification and IPC B65G53/30		
Applicant AXSIA SERCK BAKER LIMITED <i>et al.</i>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
  - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☐ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain documents cited
  - VII ☐ Certain defects in the international application
  - VIII ☐ Certain observations on the international application

Date of submission of the demand  16.12.2003	Date of completion of this report  05.04.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Papatheofrastou, M  Telephone No. +31 70 340-4422 

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/02693

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1, 3, 5-12	as originally filed
2, 2A, 4A	received on 12.01.2004 with letter of 07.01.2004
4	received on 12.03.2004 with letter of 05.03.2004

**Claims, Numbers**

2	as originally filed
1, 3-34, 36	received on 12.01.2004 with letter of 07.01.2004
35	received on 12.03.2004 with letter of 05.03.2004

**Drawings, Sheets**

1/3-3/3	as originally filed
---------	---------------------

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/02693

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 36

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 36

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the Standard.

☐ the computer readable form has not been furnished or does not comply with the Standard.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-35
	No: Claims	
Inventive step (IS)	Yes: Claims	1-35
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-35
	No: Claims	

2. Citations and explanations

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/02693

---

**see separate sheet**

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

2.1 Reference is made to the following document:

D1: US-A-3 178 233 (BREDTHAUER RAYMOND O) 13 April 1965 (1965-04-13)

**Claim 1**

2.2 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses on column 3, line 52 to column 5, line 19, figures 1-13, a fluidising apparatus including a supply duct (7) for supplying liquid under pressure to a lower portion of a vessel (1) containing a fluidisable material, the supply duct extending into the vessel and including at the outlet end thereof one or more jets (39) for directing the flow of liquid into the vessel substantially transversely to the major axis of the supply duct, and an outlet duct (9) for removing the fluidised material from the vessel (the references in parentheses applying to this document), where the subject matter of claim 1 differs in that the inlet end of the outlet duct is protected from ingress of non-fluidised material by a flange member located between the jets and the inlet end of outlet duct, the flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

The subject-matter of claim 1 is therefore novel (article 33(2) PCT).

2.3 The problem to be solved by the present invention may therefore be regarded as improving the deflection of fluidised material near the base of the vessel into the discharge pipe and at the same time preventing the sand from settling in the base of the device when slurry is not been drawn (page 9, lines 4-13).

2.4 The solution proposed in claim 1 of the present application can be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

This solution is not disclosed by D1 as there is no provision of a flange member between the jets and the inlet of the outlet duct, but instead of a bonnet located

above the concentric inlet and outlet conduits. Furthermore, the bonnet member prevents the jets from reaching areas above the bonnet, whereas the flange member of the present application does not block water coming out of the jets.

- 2.5 None of the available prior art documents discloses to the person skilled in the art this alternative way of providing a flange member between the jets and the inlet of the outlet duct.

### **Claim 35**

- 2.6 The document D1 is regarded as being the closest prior art to the subject-matter of claim 35, and discloses on column 3, line 52 to column 5, line 19, figures 1-13, a method of treating fluidisable material in a vessel, including the steps of: supplying liquid under pressure to a vessel (1) the liquid being emitted into a lower portion of the vessel (1) as one or more jets (39) substantially transverse to the major axis of the supply duct, removing the fluidised material from the vessel (the references in parentheses applying to this document), where the subject matter of claim 1 differs in that the inlet end of the outlet duct is protected from ingress of non-fluidised material by a flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

The subject-matter of claim 35 is therefore novel (article 33(2) PCT).

- 2.7 The problem to be solved by the present invention the same as the invention described by claim 1, that is to improve the deflection of fluidised material near the base of the vessel into the discharge pipe and at the same time to prevent the sand from settling in the base of the device when slurry is not been drawn (page 9, lines 4-13).
- 2.8 Claim 35 of the present application can be considered as involving an inventive step (article 33(3) PCT), for reasons equivalent to those mentioned in points 2.3 to 2.5 and 2.7 above.

### **Dependent Claims**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/GB03/02693

2.8 Claims 2-34 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

12.01.2004

2

(40)

is taking place, the vortex it creates causes a disturbance that extends a considerable distance into the vessel. This can disturb the gravity separation and the water and the oil may become mixed together again. The vortex can also draw oil into the apparatus so that oil is discharged in the slurry. If this happens then the oil will usually have to be separated from the slurry to avoid pollution and monetary loss.

US 3,178,233 shows a fluidising arrangement for a chamber including an inlet pipe which is concentric with and surrounding an outlet duct. A bonnet can be connected so that the inlet jets are located beneath the lower surface of the deflector. GB 1348042 shows an apparatus having a rotatable cylindrical inlet duct with a single nozzle at its upper end. Detection rods are used to determine the level of material in the tank and feedback from the detectors are used to control the speed of rotation.

According to a first aspect of the present invention there is provided fluidising apparatus including:

a supply duct for supplying liquid under pressure to a lower portion of a vessel containing a fluidisable material, the supply duct extending into the vessel and including at the outlet end thereof one or more jets for directing the flow of liquid into the vessel substantially transversely to the major axis of the supply duct, and

an outlet duct for removing the fluidised material from the vessel, wherein the inlet end of the outlet duct is protected from ingress of non-fluidised material by a flange member located between the jets and the inlet end of outlet duct, the flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

The outlet duct may surround the outlet end of the supply duct and may be substantially co-axial therewith.



2A

The flange member may be fitted around a portion of the supply duct located inside the vessel.

5 The flange member may also assist in directing the fluidised material towards the outlet duct. The diameter of the flange member may be at least equal to an adjacent portion of the diameter of the outlet duct. The flange member may include a groove on its surface facing the outlet duct. The outlet duct may project at least partially into the groove. The distance between the outlet duct and the flange member may be adjustable.

the vessel. The apparatus may further include a hydrocyclone, typically adjacent the outlet duct.

According to a second aspect of the invention there is provided a vessel fitted with a fluidiser apparatus substantially as described above.

5           The vessel may be an open or closed pot. The supply duct may be connected directly to the outlet duct via a valve. The valve can allow the concentration of slurry in the outlet duct to be adjusted.

10           The outlet duct may pass through a cyclone, preferably a pressure reducing cyclone having a single outlet. The flow rate at the outlet duct may be sensed and the flow rate in the supply duct is controlled accordingly.

According to yet another aspect of the present invention there is provided a method of treating fluidisable material in a vessel, the method including steps of:

15           supplying liquid under pressure to a vessel, the liquid being emitted into a lower portion of the vessel as one or more jets substantially transverse to the major axis of the supply duct, and

20           removing the fluidised material from the vessel wherein the inlet end of the outlet duct is protected from ingress of non-fluidised material by a flange member located between the jets and the inlet end of the outlet duct, the flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

Whilst the invention has been described above, it extends to any inventive combination of the features set out above or in the following description.

25           The invention may be performed in various ways, and, by way of example only, embodiments thereof will now be described, reference being made to the accompanying drawings, in which:-

4A

Figure 1 illustrates schematically an open vessel fitted with a fluidiser;  
Figure 2 details a first embodiment of the fluidiser, and  
Figures 3 to 9 detail alternative embodiments of the fluidiser

5

EPO - DG 1

12. 01. 2004

13

(40)

CLAIMS

1. Fluidising apparatus including:

a supply duct (1) for supplying liquid under pressure to a lower portion of a vessel (11) containing a fluidisable material, the supply duct extending into the vessel and including at the outlet end thereof one or more jets (212) for directing the flow of liquid into the vessel substantially transversely to the major axis of the supply duct, and

an outlet duct (12) for removing the fluidised material from the vessel, characterised in that the inlet end of the outlet duct (12) is protected from ingress of non-fluidised material by a flange member (214) located between the jets and the inlet end of outlet duct, the flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

2. Apparatus according to Claim 1, wherein the outlet duct (12) surrounds the outlet end of the supply duct (1) and is substantially co-axial therewith.

3. Apparatus according to Claim 1 or 2, wherein the flange member (214) is fitted around a portion (204) of the supply duct that extends into the vessel (11).

4. Apparatus according to any of the preceding Claims, wherein the flange member (214) also assists in directing the fluidised material towards the outlet duct (12).

5. Apparatus according to any one of the preceding Claims, wherein the diameter of the flange member (214) is at least equal to the diameter of an adjacent portion of the outlet duct (208).

6. Apparatus according to any one of the preceding Claims, wherein the flange member (214) includes a groove (215) on its surface that faces the outlet duct (208).

7. Apparatus according to Claim 6, wherein the outlet duct (208) projects at least partially into the groove (215).
8. Apparatus according to any one of the preceding Claims, wherein the distance between the outlet duct (208) and the flange member (214) is adjustable.
9. Apparatus according to any one of the preceding Claims, wherein the supply duct (1) and/or the outlet duct (12) is substantially cylindrical.
10. Apparatus according to Claim 9, wherein the diameter of the outlet duct (208) varies along its length.
11. Apparatus according to Claim 10, wherein an upper portion of the outlet duct (208) is narrower than a lower portion.
12. Apparatus according to any one of the preceding Claims, wherein the fluidiser apparatus is partially housed within a housing (206) extending down from the base of the vessel (11).
13. Apparatus according to Claim 12, wherein a space (209) exists between the inner surface of the housing (206) and the outer surface of the outlet duct (208).
14. Apparatus according to any one of Claims 9 to 13, further including a body portion (202) surrounding the supply duct (204) and substantially blocking the outlet duct (208) apart from an aperture through which the fluidised material can pass.
15. Apparatus according to any one of the preceding Claims, further including an aperture or bore (501) acting as a bypass between the supply duct (204) and the outlet duct (208).
16. Apparatus according to Claim 15, wherein a valve (502) is fitted to the bypass aperture or bore (501).

17. Apparatus according to any one of the preceding Claims, wherein the supply duct includes an L-shaped portion (203) and is connected to a substantially horizontal pipe (1) leading to the fluidising apparatus.

18. Apparatus according to any one of the preceding Claims, wherein the outlet duct includes an L-shaped portion (216) leading to a substantially horizontal pipe (12) leading away from the fluidising apparatus.

19. Apparatus according to any one of the preceding Claims, wherein the supply duct (204) directs the flow of liquid into the vessel (11) in a plurality of directions substantially radially to the major axis of the supply duct.

20. Apparatus according to Claim 19, therein the outlet end of the supply duct is fitted with a plurality of nozzles (212) arranged radially therearound.

21. Apparatus according to Claim 20, wherein the nozzles are arranged in a plurality of vertical tiers.

22. Apparatus according to Claim 20 or 21, wherein the nozzles produce a fan spray.

23. Apparatus according to Claim 19, wherein the outlet end of the supply duct includes a cap (310) having a plurality of radially arranged slots (314).

24. Apparatus according to Claim 1, wherein the supply duct (1) is remote from the outlet duct (12).

25. Apparatus according to Claim 1, wherein the supply duct (1) is parallel along part of its length with part of the outlet duct (208).

26. Apparatus according to any one of the preceding Claims, wherein a portion (204) of the supply duct extends into the vessel (11) through the base of the vessel.

27. Apparatus according to Claim 26, wherein the portion (204) extending into the vessel (11) has a length shorter than the diameter of the vessel.

28. Apparatus according to any one of the preceding Claims, further including a hydrocyclone adjacent the outlet duct.

29. A vessel (11) fitted with fluidiser apparatus (10) according to any one of the preceding Claims.

5 30. A vessel according to Claim 29, wherein the vessel (11) is an open pot.

31. A vessel according to Claim 29, wherein the vessel (11) is a closed pot.

32. A vessel according to any one of Claims 29 to 31, wherein the supply duct (1) is connected directly to the outlet duct (12) via a valve (16).

10 33. A vessel according to any one of Claims 31 to 32, wherein the outlet duct (12) passes through a pressure-reducing cyclone (18).

34. A vessel according to any one of Claims 29 to 33, wherein the flow rate at the outlet duct (12) is sensed and the flow rate of the liquid in the supply duct (1) is controlled accordingly.

15 35. A method of treating fluidisable material in a vessel, the method including steps of:

supplying liquid under pressure to a vessel, the liquid being emitted into a lower portion of the vessel as one or more jets substantially transverse to the major axis of the supply duct, and

20 removing the fluidised material from the vessel, the method characterised in that the inlet end of the outlet duct (12) is protected from ingress of non-fluidised material by a flange member (214) located between the jets and the inlet end of the outlet duct, the flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

25 36. Fluidising apparatus substantially as herein described with reference to the accompanying drawings.